Will diesel's demise burn up oil & gas share prices? Insights from Repsol

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Abstract

The winds of change are blowing in the oil and gas industry. Recent years events have put pressure in the fuel-power cars thanks to the growing awareness of their harmful effects on the environment, forcing governments throughout the world to act, implementing new policies aiming to counterbalance this problem.

As these events are still quite recent, it cannot be accurately predicted what will happen to fossil fuels, specifically diesel, since fuels are of very high importance in the modern world, the most plausible trend is the detachment of diesel engines.

Operating in all areas of the industry, an imposing company in this sector is Repsol, considered one of the largest oil companies in the world.

Taking into consideration the high degree of volatility presented in this industry, this dissertation does not pretend to provide a buy or sell recommendation but assess the impact that the foreseeable outcomes might bring. Three different points of view will be presented with the intention of analysing the predictions that were made, about possible market movements in relation to diesel in the coming years.

To estimate the value of Repsol's shares the FCFF method was developed for each approach. This resulted in a share price value of 20.47€ in the neutral scenario, 11.52€ in the negative scenario and 23.84€ in the positive scenario.

Keywords: Equity valuation; Energy transition

JEL Classification: G32 – Financing Policy; Financial Risk and Risk Management; Capital and Ownership Structure; Value of Firms; Goodwill

Resumo

Os ventos de mudança sopram na indústria do petróleo e do gás. Recentes eventos têm colocado pressão nos carros movidos a diesel devido à crescente consciencialização dos efeitos negativos que estes provocam no ambiente, forçando governos por todo o mundo a agir através da implementação de novas políticas com o objetivo de contrabalançar este problema.

Sendo estes eventos ainda recentes, não se pode prever com exatidão o que irá acontecer aos combustíveis fósseis, mais especificamente ao diesel, visto que os combustíveis representam uma importância muito elevada no mundo moderno, a tendência mais plausível corresponde ao distanciamento dos motores movidos a diesel.

Com operações em todas as áreas da indústria, uma empresa imponente neste setor é a Repsol, considerada uma das maiores empresas petrolíferas do mundo.

Tendo em consideração o elevado grau de volatilidade apresentado neste setor, esta dissertação não pretende fornecer uma recomendação de compra ou venda, mas avaliar o impacto que as antevisões que têm sido feitas podem trazer. Para isso, apresenta três pontos de vista com a intenção de analisar as previsões em relação aos possíveis movimentos do mercado no que respeita ao diesel no futuro próximo.

Para estimar o valor das ações da Repsol o método FCFF foi desenvolvido para cada uma das abordagens. Isso resultou em um valor de preço da ação de 20,47€ no cenário neutro, 11,52€ no cenário negativo e 23,84€ no cenário positivo.

Palavras-chave: Avaliação de empresas; Transição energética

JEL Sistema de Classificação: G32 – Política de financiamento; Risco financeiro e Gestão de riscos; Estrutura de capital; Valor das Empresas; Goodwill

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List of Abbreviations

ACP – Automobile Club of Portugal

ANAREC – Portuguese National Association of Fuel Dealers

APETRO – Portuguese Association of Oil Companies

CAPM – Capital Asset Pricing Model

CAPEX – Capital Expenditures

CEO – Chief Executive Officer

CO2 – Carbon Dioxide

DCF – Discounted Cash Flow

EBIT – Earnings Before Interest and Taxes

EPA – Environmental Protection Agency

EQV – Equity Value

EV – Enterprise Value

EU – European Union

FCA – Fiat Chrysler Automobiles

FCFE – Free Cash Flow to Equity

FCFF – Free Cash Flow to the Firm

GDP – Gross Domestic Products

ICCT – International Council on Clean Transportation

IEA – International Energy Agency

LEZ – Low Emission Zones

LPG – Liquefied Petroleum Gas

MW – Megawatt

NOx – Nitrogen Oxides

OPEC – Organization of the Petroleum Exporting Countries

SCR – Selective Catalytic Reduction

TDI – Turbocharged Direct Injection

WACC – Weighted Average Cost of Capital

WC – Working Capital

WHO – World Health Organization

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1. Introduction

Awareness concerning environmental problems has been growing year by year in this century. The effects of pollution and the importance of renewable energies are now a regular discussion topic on a global scale and governments are taking more actions to reduce dirty emissions and support progress in clean energy technologies.

This increasing sense of responsibility resides in the notable effects that pollution has reached, and the notion that it has repercussions, representing direct health impacts to people, with the rise of diseases driven by air pollution and the rising levels of greenhouse effects that causes the climate changes. It is becoming increasingly clear that if humanity does not begin to act with measures that counteract these effects, the problems will become worse and harder to get around.

More recently the concentration of environmental awareness on the oil sector has risen, derived from the recent news that has emerged regarding the high pollution levels that were masked by schemes built by car manufacturers, with aim attention at diesel. This issue led to an ample amount of discussions and studies stimulating countries and organizations to evaluate measures to be taken, in order to meet the emissions reduction goals. Political pressure for the decarbonization of transport fuel rose and speculation goes in every direction, trying to predict the impacts ahead.

The oil and gas industry it's considered to be one of the biggest industries in terms of revenue and has a huge relevance since it provides for more than half of the world´s energy. Oil and gas prices are constantly undergoing large fluctuations and impacts of supply and demand have effects on companies' prices and on the economy of countries.

The purpose of companies' valuation is not only to define what should be the fair value of a company but also serves as a mean for understanding the risks that are implicit, with the possible variations that the market may present. Thus, an equity research study is important to investigate possible variations to which companies may be subjected, in order to estimate potential risks and variations, that company growth may be implicated and thereby providing relevant information for decision making.

Although the oil sector is already an area with high susceptibility to large variations, doubts about its future are currently even greater. In this matter, this dissertation main objective is not to make a recommendation on whether to buy or sell projecting the fair

price but, instead, to understand the significance of the impact that a company in the oil sector might face with the changes that are beginning to glimpse on the horizon.

The elaboration of this dissertation will be focused on Repsol S.A., a referenced company in the oil sector. The structure will be composed by a literature review with the description of the concepts behind valuation and theoretical methodologies that are considered to be the most used models, the Multiples Valuation methodology and the Discounted Cash Flow (DCF) methodology, within which will be presented the Free Cash Flow to the Firm (FCFF) and Free Cash Flow to Equity (FCFE).

The following sections of this research will present an overview of Repsol, its history and historical performance. Afterward, an overview of the industry will be presented, focusing more on the problem in question, namely the factors that affect the high volatility of this market, and the verified changes that fuels have undergone in recent years.

The estimations for the value of Repsol will be based on the DCF approach, through the FCFF. With the purpose of understanding the effects that these forecasts might have on a company, there will be exposed three models representing a neutral scenario, a positive scenario and a negative scenario that characterize the speculations that are being made regarding the future of diesel and the effects that this may have in the value of the company.

Lastly, will be presented the conclusions and the three scenarios are compared, according to the results obtained.

2. Literature review

2.1. Introduction to valuation

It's in human nature to try to foresee the outcome of a decision that's being made in the present and learn the possible benefits or consequences that the future might bring. To value a company, we must take into consideration the different means that the company business involves. Both financial and non-financial aspects should be taken into consideration to fully understand the market in which the firm is inserted.

Correct valuation of a company has great importance in the decisions that managers must face in their day to day decisions, and consequently, it plays a key role in many areas of finance. The main purpose of the valuation of companies is to define the best financial strategy to be used in several financial decisions that a company need to take. As Damodaran (2006) asserts, from a corporate finance perspective, "we consider how best to increase firm value by changing its investment, financing and dividend decisions".

Valuation can also be used as a mean to help predict future market prices by applying investments based on corporate evaluation, with the goal of obtaining a capital gain. Damodaran (2006) states that, from a portfolio management position, "we expend resources trying to find firms that trade at less than their true value and then hope to generate profits as prices converge on value", also from a market efficiency standpoint he stated that, "we analyse whether market prices deviate from value, and if so, how quickly they revert back".

By virtue of the great number of different facets of business and industry sectors that need to be considered, the models that exist today are endowed with a certain subjectivity. Each model considers different aspects of a company to perform its corporate valuation. Thus, we can assume that there is no single model that fits completely into the overall corporate sector. Every valuation model is based on assumptions, hence the valuation provides only a point estimate of the financial value of the company. As a result, opinions diverge in the definition of the model that is better suited to evaluate a company's business.

Notwithstanding the fact of the vast amount of approaches that exist, Damodaran (2012) refers to three methodologies as a base for valuation. The discounted cash flow valuation, the relative valuation, also known as multiples valuation and the contingent claim valuation. The following sections expand on the first two alternatives mentioned.

2.2. Discounted Cash Flow model

The DCF approach is commonly the most used model, a fact that proceeds from that in general, analysts consider this approach as being the most theoretically robust theory. As Koller, Goedhart, and Wessels (2015) state the discounted cash flow "is the most accurate and flexible method for valuing companies".

In order to reach the fair value of a company, this model's main purpose is to use cash flows that are expected to be generated in the future and discount them at the most suitable rate. The discount rate applied should reflect the risk of the expected future cash flows, as such, it can be considered as the opportunity cost of the designated investment against a passed-on investment of identical risk.

$$V = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \cdots + \frac{CF_n + VN_n}{(1+r)^n} \quad (1)$$

$CF_i \rightarrow Cash\ flow\ generated\ by\ the\ company\ in\ the\ year\ i$
$V_n \rightarrow Residual\ value\ \ of\ the\ company\ in\ the\ year\ n.$
$r \rightarrow Appropriate\ discount\ rate\ for\ cash\ flow\ risk.$

Further, this thesis will be focussed on the analysis of the two main variations of the DCF model, the Free Cash Flow to Firm Valuation (FCFF) and the Free Cash Flow to Equity Valuation (FCFE).

2.2.1. Free Cash Flow to Firm Valuation (FCFF)

The FCFF corresponds to the net financial earnings generated by the operations, after operating expenses and capital expenditures of the company are paid, that is available to compensate debtholders and shareholders.

$$FCFF = EBIT(1 - Tax\ rate) + Depreciation/Amortization - Capital\ Expenditure \pm Variation\ in\ Working\ Capital \quad (2)$$

For the computation of FCFF, the discount rate must reflect the opportunity cost of the totality of equity and of the external capital, weighted by its significance in the capital structure, hence the rate to be considered should be the WACC (Weighted Average Cost of Capital).

The value of the company can, therefore, be found through the following formula:

$$Enterprise\ Value = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} \quad (3)$$

Or, if the company finds itself growing at a steady rate for some reasonable period of time, the formula can be adjusted to:

$$Enterprise\ Value = \sum_{t=1}^{n} \frac{FCFF_t}{(1+WACC)^t} + \frac{FCFF_n \times (1+g)}{\frac{WACC-g}{(1+WACC)}} \quad (4)$$

2.2.1.1. Weighted Average Cost of Capital (WACC)

Luehrman (1997) states that "WACC is just what it says it is: a weighted average of the after-tax costs of different sources of capital, in which each is weighted by the fraction of the capital structure it represents". WACC is a suitable discount rate for future cash flow since it is the rate of return that investors expect to earn from investing in the company, however, a WACC-based model has a greater precision when the debt-to-value ratio presents low variations (Koller, Goedhart, and Wessels, 2015).

$$WACC = \frac{E}{E+D} \times r_e + (1-t) \times \frac{D}{E+D} \times r_d \quad (5)$$

$E \rightarrow Equity\ Market\ Value$

$D \rightarrow Debt\ Market\ Value$

$r_e \rightarrow Cost\ of\ equity$

$r_d \rightarrow Cost\ of\ debt$

$t \rightarrow Tax\ rate$

2.2.1.1.1. Cost of equity (r_e)

The cost of equity or expected return on equity can be defined as the return that investors or shareholders require to compensate for the risk of financial investment. To reach this cost it's essential to estimate the expected rate of return of the company´s shares, however, this is not obvious and requires modelling. The most common model used to assess the risk and return of an asset is the capital asset pricing model (CAPM). Notwithstanding the fact that there are other models like the Fama-French model that, as

Koller, Goedhart, and Wessels (2015) say, "defines risk as a stock's sensitivity to three portfolios: the stock market, a portfolio based on firm size, and a portfolio based on book-to-market ratios", they still consider CAPM to be the best model to valuate the cost of equity.

CAPM formula is as follows:

$$r_e = r_f + \beta \times (r_m - r_f) \quad (6)$$

$r_f \rightarrow Risk - free\ rate$
$\beta \rightarrow Beta$
$r_m \rightarrow Expected\ Return\ on\ a\ Market\ Portfolio$
$r_m - r_f \rightarrow Market\ risk\ premium$

2.2.1.1.2. Risk-free rate (r_f)

The risk-free rate illustrates an asset that is considered to be risk-free, that is, it does not represent a risk of reinvestment or default, in which case the current return of the asset will correspond to its expected return.

Government high liquidity long term securities, or default-free bonds, commonly used as the risk-free rate basis. Following Damodaran's (2012) line of thought, the treasury bond is the better choice to use as a benchmark if the company is looking for a five or more years in the time horizon of the investment since it provides more predictable returns over time, and if the interest concerns in a single time period, a treasury bill rate would be better suited as a risk-free rate since it's not affected by interests rates throughout time.

2.2.1.1.3. Market risk premium ($r_m - r_f$)

As the above formula shows, the market risk premium reflects the difference between the expected return of a market portfolio and the risk-free rate. Following the common assumption that investors are risk-averse, Damodaran (2012) describes the risk premium as "the price attached to risk", that investors need, considering an investment in a market portfolio where assets contain risk, as opposed to an investment where assets presented themselves as riskless.

Some authors, such as Fernandez (2004) defend some alternative methods, that base themselves in the fact that historical data is not a good tool to measure future returns, or that more recent information is more appropriate. Despite the different opinions on this matter, the most common manner to attain the market risk premium is to use historical data references from markets. The main purpose is to analyse the variance between annual return on stocks, against the return on bonds covering a fair period of time. For this method to be trustworthy, it has to be assumed that the average risk of investments is stable over time.

2.2.1.1.4. Beta ($\boldsymbol{\beta}$)

As Koller, Goedhart, and Wessels (2015) state "CAPM adjusts for company-specific risk through the use of beta, which measures how a company's stock price responds to movements in the overall market". To obtain the beta of a company it is necessary to make an estimate, as it cannot be directly observed in the market. As a mean to estimate a beta the conventional approach is to perform a linear regression between the historical returns of the company and the returns of the market portfolio, comparing the industry, considering the size of the period selected for the estimation, the return intervals and the identification of a similar market portfolio.

According to Koller, Goedhart, and Wessels (2015), the market model is the most used to compute the company´s raw beta:

$$r_i = \alpha + \beta \times r_m + \varepsilon \quad (7)$$

The estimation of beta is hardly accurate, as such there is not a single correct period to consider in the measurement of beta. Monthly data is the predominant choice, as it lowers the issue that using a lower period might bring, due to less frequent stock trades which would lead to a deceiving result since stock value might change even if it's not being traded (Koller, Goedhart, and Wessels 2015).

Another way to identify the beta is to look at companies that operate in the same industry, based on the assumption that these companies should have similar betas once financial leverage is controlled for. This way, using the unlevered betas of a relatively large number of comparable companies provides the means to lower the error and sharpen the precision

of the beta of the company. The simplest way to find the beta using this method is to compute the appropriately weighted average of the sample gathered.

2.2.1.1.5. Cost of Debt (r_d)

The financial structure of a company is typically endowed with debt in addition to equity. Until its repayment, the existing debt originates an interest outflow, required by the debtholders.

According to Koller, Goedhart, and Wessels (2015), a suitable way to estimate the cost of debt for investment-grade companies is to use the yield to maturity of long-term, option-free company bonds.

Damodaran (2002) says that the debt cost is determined by the risk-free rate, the default risk and the tax benefits associated with debt and states that "As the default risk of a firm increases, the cost of borrowing money will also increase". Therefore, another way to reach the cost of debt is if we account for the default risk that is associated with the default spread and add it to the riskless rate.

$$r_d = r_f + credit\ spread \tag{8}$$

2.2.2. Free Cash Flow to the Equity (FCFE)

This variation of the DCF model, as stated by Damodaran (2006), the FCFE represents the overall cash that remains to pay stockholders, in form of dividends, after every interest and principal payments, and operating expenses are paid, as well as all investments necessary to the business, are made.

FCFE can be represented as the following formula:

$$\begin{aligned} FCFE = {} & Net\ Income + Depreciation/Amortization - CAPEX \\ & \pm Change\ in\ non\ cash\ Working\ Capital \\ & - New\ Debt\ Issued - Debt\ repayments \end{aligned} \tag{9}$$

If the FCFF is already known, the calculation of FCFE can be adjusted by adding to the FCFF net borrowings and deducting the after-tax interest expenses:

$$FCFE = FCFF - (1 - t) \times Interest + Net\ Borrowings \quad (10)$$

The main aim of the FCFE is to evaluate the company from the perspective of shareholders. To value a company from this perspective we need to consider the potential dividends, through the expected cash flows of equity, the rate of return required by the company's shareholders.

$$Equity\ Value = \sum_{t=1}^{n} \frac{FCFE_t}{(1 + r_e)^t} \quad (11)$$

Damodaran (2012) states that the formula can be widened if it is expected a growth phase in the company, "where earnings and dividends can grow at rates that are very different than stable growth values".

$$Equity\ Value = \sum_{t=1}^{n} \frac{FCFE_t}{(1 + r_e)^t} + \frac{FCFE_{n+1}}{(r_e - g)(1 + r_e)^n} \quad (12)$$

2.3. Multiples valuation

The multiples valuation is a widely utilized method of comparison due to its simplicity. The concept of this relative valuation is to establish the value of the company by using financial indicators of comparable companies that perform in the same industry and have similar capital structure and size.

As Fernandez (2001) sustains, the use of multiples as a method to perform the valuation of a company is more appropriate as a complementary approach to another valuation method, since the outcome that this method provides can be questionable, in the sense that commonly it has a wide probability of dispersion in the results. As such the main advantage of performing an equity valuation using multiples is to be able to compare and ascertain a valuation made based on comparables of companies that operate in the same industry.

For the right application of this method Damodaran (2002) recommends a four-step process that begins in the selection of what is called the peer group, a pre-selected set of companies with similar market characteristics to the one that is being analysed. The following step is to choose the better-fitted multiples along with the assessment of the way the multiples behave across the market. The third step consists in the computation of

the multiples and the final step is to combine the multiples calculation of the peer group through using statistical parameters, such as the mean or the median. The aggregated value of the multiples can then be applied for the estimation of the company's value.

Fernandez (2001) presents a selection of the most common multiples applied in the valuation of companies categorized into three groups:

Table 1 - Most commonly used multiples

Multiples based on Market Capitalization	PER → Price Earnings Ratio P/CE → Price to Cash Earnings P/S → Price to Sales P/BV → Price to Book Value
Multiples based on Company's Value	EV/EBITDA → Enterprise value to EBITDA EV/Sales → Enterprise Value to Sales EV/FCF → Enterprise Value to Unlevered FCF
Growth-referenced multiples	PEG → PER/growth of earnings per share in the next few years EV/EG → Enterprise value to EBITDA growth

Source: Fernandez (2001)

3. Company and industry overview

3.1. A brief history of Repsol

The Repsol Group, or as we know it today Repsol S.A., was created in 1987. This process had begun in 1981, with the establishment of the National Hydrocarbons Institute (INH), an entity composed by a merger of several Spanish state-owned companies, among them, Petronor, Hispanoil and CAMPSA. This entity's task was to get these companies ready for their privatization by improving their competitiveness. This restructuring occurred as a result of the willingness that Spain had to enter into the European Economic Community, which forced the end of the state monopoly on hydrocarbons. The purpose of the creation of Repsol was to establish a stable oil system in Spain at the level of foreign competitors.

The name Repsol emerges from what was considered to be the star product sold by REPESA[1], a product well-known in the market and easy to say in various languages. These facts, along with the company's new objective to establish a prestigious brand with global recognition, led to the adaptation of the name of the product by the company.

The path towards privatization began in 1989 through a contract between Repsol, INH and the Spanish bank BBV. This process lasted 8 years and ended in 1997 culminating in Repsol's privatization process.

In 1999 Repsol rose to a multinational company status, with the acquisition of what was considered to be the most relevant company in the oil and gas industry in South America, Argentina's YPF S.A., buying a stake of 97.81%. This merger multiplied their reserves and production by four, leading to a capital increase of 288 million shares. Repsol became one of the ten largest oil companies in the world. Years later, in 2014, Argentina's YPF S.A. was expropriated by the government of Argentina that took 51% of the share capital of YPF in exchange of approximately 4 billion euros.

[1] REPESA (Refinería de Petróleos de Escombreras S.A), one of the companies that was merged by INH, was a small refinery company that produced lubricants and asphalts located in the Valley of Escombreras (Cartagena). They developed a lubricant (Repsol) that had high reputation worldwide due to its presence in motorcycle races.

In the following year of 2015, Repsol climbs again to the club of the world's largest energy companies, expanding its position by acquiring Talisman Energy, one of the major companies in Canada.

3.2. Repsol's overview

Repsol S.A is a company based in Spain that has its main headquarters located in Madrid. Leader in the energy sector in Spain, Repsol engages through many of its subsidiary companies in many activities from the extraction and production of crude oil and natural gas, to the refinement of crude to obtain different petroleum derivatives and liquefied gas (LPG). Repsol's retails these refined products such as gasoline, diesel and other products throughout its network of service stations.

Repsol has over 25000 employees that carry out its activities on a global scale in 37 different countries. The business segments that the company engages, besides the natural activities related to the company's administration, can be divided into two main segments, Upstream and Downstream.

The Upstream segment includes the search for the oil and gas reservoirs, the implementation of the platforms that perform the extraction of the crude oil and the production. The main assets owned are located in Latin America, North America and Southeast Asia.

The Downstream segment involves oil refining, the production, marketing and commercialization of petroleum, LPG and other petrochemical products, as well as the supply and trade of crude oil in the world markets.

Nowadays Repsol shows an average net capacity to produce around 700000 barrels of oil per day and a refining capacity of 1 million barrels per day. It also operates more than 4700 service stations spread across Spain, Portugal, Peru, Italy, and Mexico. More recently, with a forward-looking perspective, Repsol has acquired low-emissions power generation assets, with a capacity to produce a total of 2,950 MW.

3.2.1. Share price historical performance

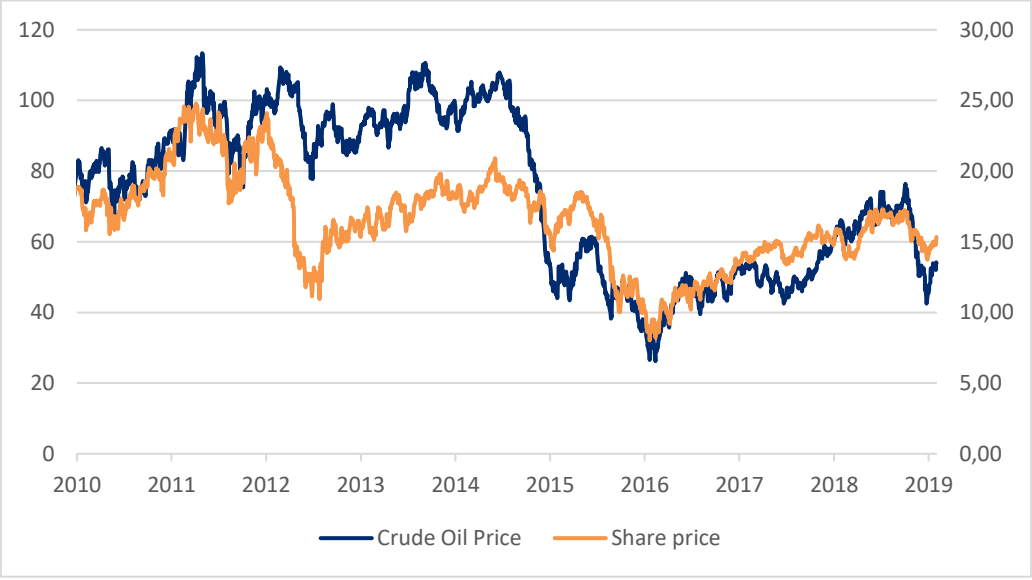
Over the last 10 years, Repsol's stock price has suffered quite large fluctuations. The company reached its peak price in April 2011 at €24,79.

Shortly after, at the beginning of 2012 Repsol's share price plummeted as a result of the announcement of a potential dispute between the Argentinean government and Repsol over the expropriation of 51% of YFP. This fact, along with a general oil prices drop, led investors to be concerned, driving the price down. By the end of the first semester of 2012, the share prices were 50% lower when comparing to the start of the year.

The lowest price recorded was in January 2016 with the stock price falling to €8,02. The main contributor to the volatility of Repsol's share price is without a doubt the oil price. The fall was correlated with the selling price of crude oil that plummeted throughout 2014 and 2015. The reason behind this steep drop was a combination of both supply and demand. The proportions of the large decline showed that the rise of the supply, linked to improvements in drilling technology, was an as important factor as the decrease of the demand[2], associated with slowing growth of emerging markets as China. Also, the timing coincides with the burst of the diesel scandal that is possibly allied to the factors that contributed to this global fall in the oil markets.

Since then, until early 2019, there has been a gradual rise in the price of Repsol shares, again showing a high correlation with the global oil price market.

Figure 1 - Repsol share price fluctuation in the last 10 years (values in €)



Source: Repsol & Bloomberg

[2] See appendix A.

3.3. Industry overview

3.3.1. Oil market volatility factors

Oil is currently the most consumed energy source in the world, as such, it represents a fundamental role in economies and global development. Crude oil can be refined into a great number of products that serve demands various needs. The crude price depends on the quality of the product itself and it can be produced differently to accompany consumers requirements.

Due to the scale of the industry, as it is an international business that spans most of the world, estimating the oil price can be quite elaborate. The main factor that influences the determination of the oil price, as it does in other commodity markets, is the situation of demand and supply. Essentially, if there is an excess supply, prices are likely to fall and the contrary if the order is reversed.

There are some aspects that influence supply and demand. OPEC[3] controls around 40% of the world supply making them one of the main influencers of the fluctuations in oil prices. This organization manages and controls production levels to match global demand and if there is a misalignment between the demand and the production, prices are affected.

Other factors affecting the changes in the balance between supply and demand are economic growth, as a greater economic expansion leads to a higher necessity of oil, increasing the demand. The weather can also influence the demand of oil, as in the cold season the demand of heating oil grows, making oil traders increase their inventory of this type of product or the summer season when people on holidays make large trips causing an increase of products as gasoline and diesel.

The discovery or the growing implementation of a new alternative energy, that replaces oil's roles, may drive demand down and push prices in the same direction if it can compete in prices and meet consumers requirements.

Another key driver in this volatile market is the sentimental factor. Atypical circumstances in political and economic atmospheres or major oil producers, news may

[3] OPEC is an international organization with 14 of the world's major oil-exporting countries. Their mission of this organization is to regulate oil supply in order to ensure a market stabilization, avoiding market fluctuations that could disturb economies.

cause the price to change through concerns and anxiety even if production and exportation volume is not directly affected.

Oil is traded in international markets in US dollars, therefore any changes in foreign countries will have an impact on the price of the trade and depending on the direction of the fluctuation it will make cheaper or costly for the foreign currency.

Summing up, oil is a commodity that tends to have larger fluctuations than other commodities due to the several factors that can influence the price. As such, the estimation of future prices is very challenging since predictions can never be absolute as there are many variables to consider and the outcome in the markets cannot be predicted with certainty.

3.3.2. Diesel and gasoline price gap

Petroleum has thousands of derivative products, such as, asphalt, lubricants, LPG also known as propane or butane that can be used as fuel for vehicles, cooking equipment or heating appliances, aviation fuel and the most commonly known fuels, used in the bulk of the cars fleet all over the world, the gasoline and the diesel. All these products are no more than oil derivatives that result from the refining of petroleum.

Fuels like diesel and gasoline represent nowadays the higher percentage of products used for petroleum. The composition of fuels prices can be divided into various sectors. From the extraction to the service stations, that allow us to fill up our vehicles, the crude passes by a series of steps in its journey to the final consumer.

Its price configuration starts to take form with the crude oil barrels, that are traded in the open market worldwide. In most European countries, such as Portugal, this only represents approximately a quarter of the price of the fuel. Other factors that affect the price, are related to the refinery, distribution and marketing, that added to the percentage that the crude has in the price we pay, it only represents around a third of the price.

Both diesel and gasoline are fractions of petroleum, distilled at different temperatures. The process to obtain these types of fuel is different, but this aspect is not what causes the price gap between them since the price difference from producing one over the other is not that significative.

In Europe, fuels also have a small percentage of its price that is related to the incorporation of biofuels, in order to meet a target defined by the EU to lower pollution. In essence, the greatest percentage of the price for fuels goes to taxes, that in Europe represent in average more than half of the final price of fuels.

In such a manner, it's clear that the main reason for the price gap between diesel and gasoline resides in the tax and that is a political decision which each competent authority applies as it sees fit. In America diesel never made a big incursion since gasoline remained cheaper. However, in Europe, most countries adopted a strategy, duly sponsored by European companies, to make the import of gasoline-fuelled vehicles difficult. The incentives were based in the greater efficiency of diesel motors, its reliability, since diesel outlasts gasoline in terms of oil consumption, along with a reduced tax, made diesel captivating. Recently the price of diesel has been approaching the price of gasoline, mainly due to the increase of the tax burden of diesel derived from political decisions. There are even records of some European countries where diesel has already surpassed the price of gasoline.

3.3.3. Diesel's unravel

In these last decades, diesel motors went from being encouraged by governments for their fuel economic advantages to being demonized. Despite earlier warnings from the World Health Organization, the issue was belatedly followed by authorities, predominantly due to the avoidance of the debate on the noxiousness of diesel, empowered by countries that strongly depend on the automobile industry, such as Germany.

The awareness for the environmental harms caused by diesel was introduced in 2015 after the EPA[4] started a case against Volkswagen group known as Dieselgate. This case was a worldwide scandal, where it was discovered that the German automaker was intentionally violating the Clean Air Act[5] and covering it just for the tests. The company programmed the diesel's cars system of automatic injection (TDI), to just use their emissions limitation when they were submitted to the emissions tests.

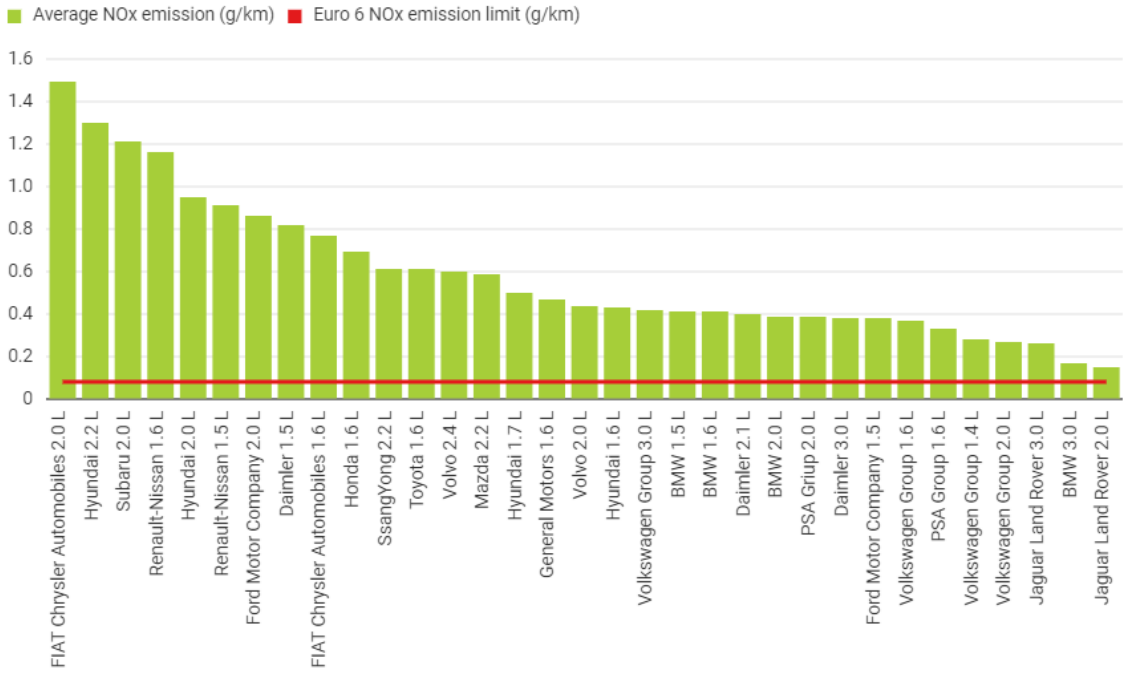
The problem of diesel when compared to gasoline motors, in terms of environmental damage, is that diesel cars produce NOx gases that directly affect people's health and are

[4] United States federal agency charged to protect human and environmental health.
[5] United States environmental law formed to oversight and control air pollution.

harmful to the environment, whereas gasoline motors emit much less of these noxious gasses. What happened in the tests, was that the controls used by Volkswagen lowered the emissions of these gases to meet the environmental accord standards, but in truth, the cars in real-world driving emit until 40 times the values permitted.

After this unveil governments across Europe began to more vigorously test diesel cars. In time several other companies were involved in this case that affects millions of cars all over the world. Furthermore, ICCT makes a study that concludes that only 10% of the Euro6[6] cars do not exceed the air pollutants released into the atmosphere limitation of 80mg/km, with respect to the NOx gas.

Figure 2 - Diesel's NOx real average emission by manufacturer and capacity



Source: ICCT

3.3.4. Is diesel really coming to an end?

3.3.4.1. Matos Fernandes theory

Who would have guessed, at the beginning of this decade that by the end of it there would be fixed dates to stop selling diesel cars? The Portuguese Minister of the Environment and Energy Transition, João Matos Fernandes, defends that it does not make sense to buy

[6] European exhaust emissions standards put in place since 1992 to restrict harmful pollutants. The standards are separated by levels that go up to Euro6. All vehicles have a Euro standard that differs depending of the emissions it puts out, usually measured by the year of the vehicle.

a diesel car in this coming decade, as he believes that in four or five years the cars most likely will not have much value in their trade.

The verdict that the 2019's S&P Global Platts Global Executive Petroleum Conference reached, where the most prestigious analysts and industry leaders debate on the prospects for the oil market, was that oil markets are facing an unprecedented uncertainty either on the supply or the demand side. As Fatih Birol, Executive Director, IEA states, "These are times of extraordinary change for the oil industry. Everywhere we look, new actors are emerging and certainties of past years are fading."

The alarming wide news that shook the world's governments, with focus on Europe due to the fact of having the highest presence of diesel cars, put pressure on the institutions and promoted a series of researches and debates around this topic. European commissioner Elzbieta Bienkowska stated that the Volkswagen fraud was a turning point in Brussels perspective on these engines.

The first WHO "Global Conference on Air Pollution and Health" took place in 2018, where it was estimated that every year more than 4 million deaths are related to air pollution. The conviction at the end of the conference was that efforts have to be made in order to attain the ultimate goal of a world free of air pollution.

European Parliament is already implementing a series of actions in order to move diesel engines to a new regulatory framework. One of the approved proposals was to stop car manufacturers paying directly to test centers to certify their vehicle's fuel consumption and emissions, breaking the proximity between these two institutions, along with a stricter criterion in the new cars permitted emissions level.

The new regulations force car brands to make large investments in the development of new technologies to significantly reduce the pollutant components, in order to keep manufacturing diesel cars. This implies a generalized adoption of SCR systems to treat the exhaust pipe gases. These tight norms affect the price of diesel cars increasing its price. Sergio Marchionne, the former Fiat Chrysler Automobiles[7] CEO, was also a supporter of the theory that the diesel motors days are coming to an end. In his point of view, the reason does not rely on the capacity to develop the technology but in the ability for the costumers to withstand the implied increase in car prices. As he puts it "The

[7] FCA Group is a multinational corporation that includes in its portfolio the car brands Abarth, Alfa Romeo, Chrysler, Dodge, Fiat, Fiat Professional, Jeep, Lancia, Maserati, and Ram Trucks.

disengagement is happening. Since Dieselgate, the share of diesel sales has reduced month by month. There's no point denying that, and it's clear that the cost of making diesel reach the new standards is going to become prohibitive."

3.3.4.1.1. Actions on diesel

In consideration of the aim set to reduce pollution and improve air quality in the cities, some European governments are already taking steps towards the upcoming changes in mobility. One major rule approved in Germany, considered to be the homeland of diesel engine, was to allow each city to enforce their own bans on the circulation of diesel cars. Many European cities followed this course of action and already have plans to either partially or fully ban diesel engines from their city centers and some even plan to ban fossil fuel-powered vehicles.

Cities across Europe have already in place LEZs programs that either involves paying a fee to be granted the circulation access in the designated area or do not authorize the access at all, for the most polluting vehicles. Each individual city presents a different range of restriction, setting their plans to challenge the emissions problem. These programs follow the European emission standards and a large part of the cities that already have this measure applied, want to increase the level of the emission standard to the latest European norm Euro 6, until 2020. It serves as a way to smooth the transition, as some of the cities have already set dates to completely ban diesel cars from their centers (table 2).

Table 2 - European cities planning to ban diesel cars

City	Country	Year of Diesel's Ban
Athens	Greece	2025
Brussels	Belgium	2030
Madrid	Spain	2025
Paris	France	2025
Rome	Italy	2024

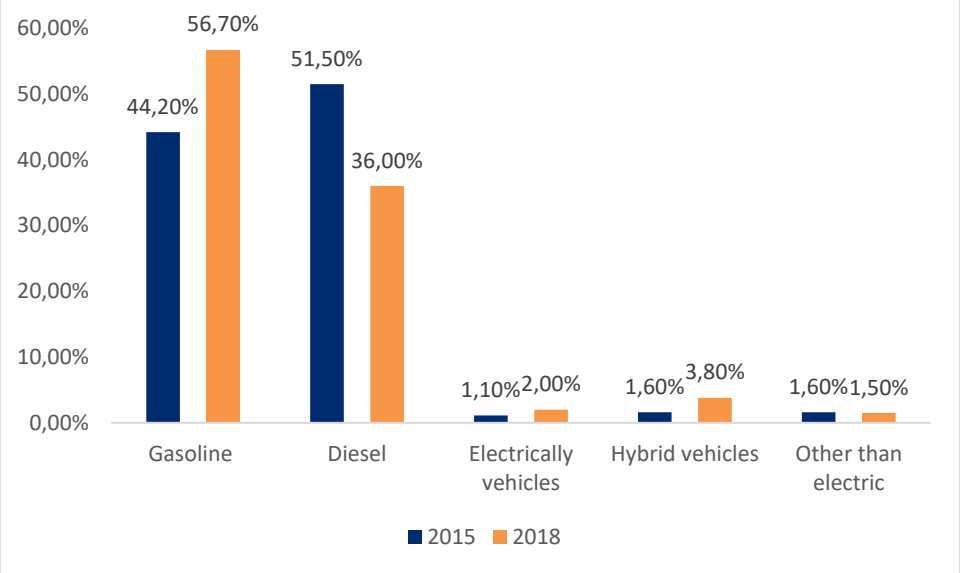
Other countries and cities have proposed to prohibit all fuel engines from circulation or to even ban the sale of passenger vehicles powered by fossil fuels between 2030 and 2040. The current intention is shifting, and no longer stands on the reduction of transport emissions but their complete elimination.

3.3.4.1.2. Current visible effects on the market

By the end of 2018, it is becoming clear that European markets are subtly showing signs concerning the pressure that has arisen around diesel engines and Matos Fernandes's words begin not to seem so farfetched.

According to JATO, a company that provides intelligence on the automotive industry, in 2018 the diesel cars registrations dropped to a market share that had last been registered in 2001. In 2015, year of the burst of Dieselgate, diesel cars dominated the market with a market share of 51.5%, fact that drastically changed with 2018's diesel sales falling sharply, reducing the market share in 15.5% when compared to 2015 (figure 2).

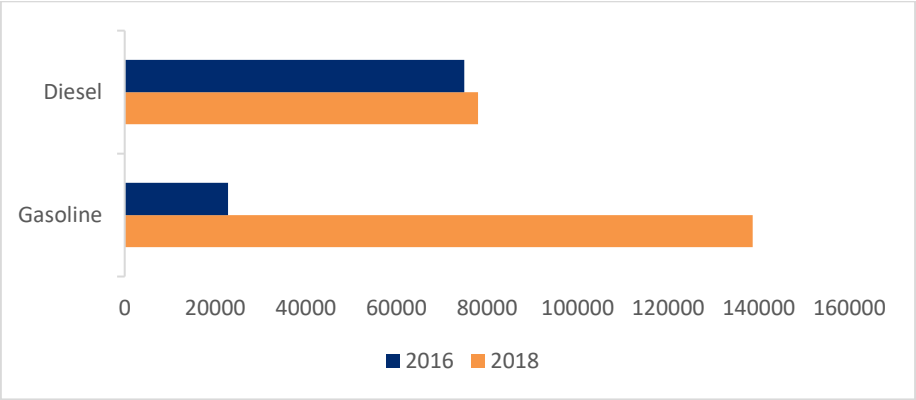
Figure 3 - Evolution of passenger cars by fuel type in the EU from 2015 to 2018



Source: ACEA

In Portugal, this growing tendency can also be observed in the production of new cars. From 2016 to 2018 the production of gasoline cars has increased abruptly, and it was by the end of 2018 around 600% higher (figure 3). Given the fact that Portugal exports approximately 90% of the manufactured cars to Europe, we can conclude that the preferences of European consumers driving down the market share of diesel and are already affecting market businesses as car factories.

Figure 4 - Portuguese car production by fuel type

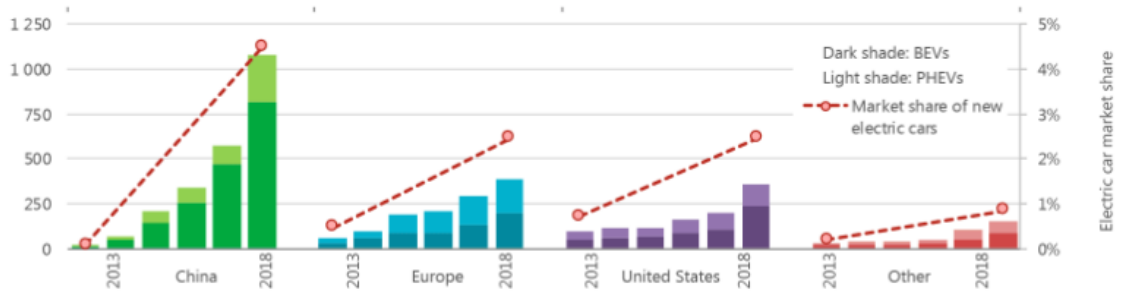


Source: ACAP

Another market facet to consider is the emerging incorporation of electric cars. Electric mobility has been increasing expeditiously and according to the 2019's IEA electric vehicles outlook, the global fleet exceeds 5.1 million vehicles, 2 million more than 2017.

The attractiveness of electric vehicles in economic terms is that these cars are much more reliable than any other fuel cars due to the simplicity of its powertrain system, it has far fewer moving parts, which translates in lower maintenance costs and no lubricants needed. Fuelling the car is also cheaper. The purchase cost is until this point one main aspect that is not in favour, though a lot of effort by manufacturers is being put in place to improve the technology used in these cars. This coupled with government support and the mass production of batteries and other essential parts makes the price progressively more affordable.

Figure 5 - Global electric car sales and market share, 2013-2018



Source: IEA Global EV Outlook 2019

Adding to several policies adopted by many countries incentive consumers to acquire electric vehicles, such as, tax benefits, pollution charges and the announced zero-emission zones. A relevant point in this upcoming transition, is the fact that several private companies are pledging to abandon the construction of diesel cars and pursue the electric

mobilization market. In this subject, some large car companies that stand out having taken action regarding diesel cars. Johan van Zyl, Toyota's CEO said that they will stop selling passenger diesel cars in Europe by the end of 2019. Carlos Ghosn, then Renault's CEO said that in the coming years their diesel offer will be cut in half. Fiat Chrysler Automobiles already announced that their strategy is aimed to abandon diesel engines in the Alfa Romeo, Fiat, Jeep and Maserati brands by 2022. The common factor is that all these companies present is the investment in vehicles powered by electricity, whether they are battery electric vehicles (BEVs) or plug-in hybrid electric vehicles (PHEVs).

3.3.4.2. Carlos Barbosa theory

In contrast to the topic discussed above, there are some parties that do not believe in the diesel's demise. In disagreement with the Portuguese Minister of Environment Matos Fernandes, the ACP president Carlos Barbosa says that the declarations of the Minister are alarmist and maladjusted. Carlos Barbosa recognizes that electric cars are a new reality in the market but defends that fuel-powered cars will not disappear in a foreseeable future. One argument behind that statement is that for him "combustion engines are increasingly efficient and clean, in some cases with more advantages over diesel than gasoline".

In accordance, Francisco Albuquerque, president of ANAREC says that car brands also share the concerns of the increasing environmental awareness and are manufacturing diesel cars less and less polluting. The argument rests on the assumption that the introduction of the new stricter emission tests, are leading to technological improvements in the performance of diesel engines in terms of emissions and instead of being the end of diesel, the good diesel will be replaced by the bad diesel.

A factor in which diesel is better compared to gasoline, with respect to motor emissions, is that diesel due to requiring less fuel to reach the same driving distance emits less carbon dioxide. CO2 is not a pollutant harmful to people, however its excess presence in the atmosphere contributes to global warming and climate change. It is also represented in the EU emissions standards account for vehicle emission efficiency. As such, if diesel technological upgrades make NOx diesel emissions lower than gasoline's, it would make diesel the less pollutant fuel and an important agent in the fight to reduce pollutant emissions as predicted in the EU legislation.

From the APETRO viewpoint, the calculations of vehicles emissions should include not only the exhaust emissions but also the emissions inherent to production. For them, the marketing done on electric vehicles of zero CO2 emissions do not reflect an honest reality throughout the economy, since extraction of raw materials and manufacturing of batteries are intensive in the emission of CO2 into the atmosphere. As such the advertised reduction in emissions from electric vehicles compared to internal combustion engines is significantly lower.

Companies like Mercedes, BMW, Jaguar Land Rover and Volkswagen Group, recognize the undeniable truth that electrification of the car market is happening. However, they claim will continue to have diesel cars in their vehicle portfolio, as do not believe in the death of diesel in the close future, defending that clean diesel engines diesel are important to achieve emissions targets.

Concerning electric vehicles, there is still a great deal of suspicion towards the relation of cost-benefit, that in the eyes of consumers is not yet clear. Electric mobility still has quite a few steps ahead in terms of development and there are some factors that presently raise concerns. Besides the purchase price that for most current models is still slightly high, other concerns reside in a short driving range, limited heating and air conditioning as it limits the cars autonomy and a lack of charging points.

Regardless of the recent events that discredit diesel-powered engines and promote the incorporation of electric cars, as it is still very recent, presents a high degree of uncertainty and many studies differ on how the market penetration of these vehicles will advance.

3.3.4.2.1. Emerging markets on influence on oil demand

Over time it has been proven that variations in oil demand of emerging markets, with relevance to China, have a great deal of weight in the determination of that path of future levels of oil demand. In 2015 China represented 12.5% of the global oil demand, however, between 2005 and 2015 half of the oil demand growth was driven by China. This shows the importance that emerging markets can have in global oil demand.

Some studies defend that China's oil demand will have a firm rise in the next decade driven by a GDP's growth. Like all projections, this one has its side of ambiguity derived from the fact that it does not consider possible policies to discourage oil consumption or the effect that technological evolution can have in oil markets.

4. Valuation

4.1. Introduction

As it's implicit in the previous sections discussed, Repsol is integrated into the oil and gas industry, considered to be one of the largest and most economically important industries in the world. This industry plays a vital role in the operation of modern society. Its scope is huge since it not only includes businesses that explore produce refine transport and sell oil and gas, such as Repsol, but also a multitude of service companies that support these activities and transactions. The economic importance of the oil and gas industry is even more vast than its scope. Changes in the price of natural gas, crude oil and petroleum products do not affect only fuel prices but also electricity prices, food prices, prices of all sorts of manufactured goods, international balances of trade and even nations GDPs.

There is a wide scope of factors that influence this sector. Politics acts as a regulator through laws and regulations. Operational costs are impacted the stricter the regulations are, making more difficult and expensive the extraction, also considering that the reserves considered easy to get are already drained. Supply and demand shifts, that can be driven by financial crisis and growth or deceleration of emerging economies, among other things, making the nature of oil production uneven. All the above, are factors that cause oil prices to fluctuate, making the market extremely vulnerable to oscillations.

To carry out, the valuation of Repsol will be made through the DFC methodology, taught in the subjects within the master course, as it is a method considered to be one of the most efficient, commonly used by financial analysts, whereas it reflects more clearly and practically the value of a company. It will be conducted through the FCFF approach with the discount rate used being the weighted average cost of capital (WACC).

In the elaboration of each scenario, sales have been considered as a base point to the estimations performed, since this sector demonstrates, as stated above, a high susceptibility to unpredictable variations making it difficult to make accurate forecasts in terms of the many elements that might have influence in such fluctuations, hence the elaboration of a hypotheses in each direction. This way, estimations were made considering the predictions made by the various agents and the circumstances existing in Repsol's financial statements. For this, it will be considered a period six years range between 2013 and 2018 of historical data, in order to obtain a reliable source of what has been the company's performance in the past years.

Relatively to the forecast period for the cash flow range, it will be considered 10 years, from 2019 to 2028. This large period was selected with the intention to permit the consummation of factors, such as the transition to electric mobility that is taking place in this sector, as the effects do not take place promptly but gradually over the years ahead.

Subsequently, in the pursuance of the estimations for the share value for Repsol, a set of assumptions will be established, where some will be general in the sense that they will be common to all scenarios and others specific to the characteristics of each perspective.

In relation to the scenarios, a neutral scenario will be constituted and used as a baseline estimate for the other two. Then it will be established a negative scenario, further described as the Matos Fernandes theory, and a positive scenario mentioned as the Carlos Barbosa theory.

4.2. General assumptions and forecasts of the scenarios

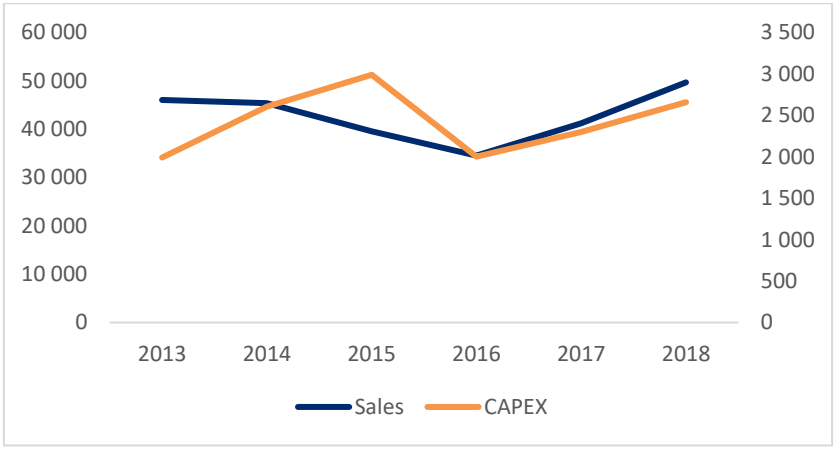
4.2.1. EBIT

As mentioned above, the elements required for the calculation of the FCFF will have their basis around projected sales. As such, the EBIT forecast will be made according to the percentual margin EBIT has over the sales presented in Repsol's annual reports. Bearing in mind that between 2014 and 2015 Repsol had low and even negative, in 2015, EBIT values, which were derived from the sharp drop in oil prices and since such events are of an unpredictable nature, for the estimation of EBIT margin, the last 3 years (from 2016 to 2018) have been considered in order to obtain an estimated margin consistent with what can be considered an evolution within a more stable period. With this the value for the forecasted EBIT will be 5.7% of sales. Additionally, it was assumed that this margin will be reached within 3 years considering a gradual growth from the verified EBIT margin in 2018 of 4.9%.

4.2.2. Capex

Notwithstanding the impact that Repsol had in sales regarding the oil price steep drop, capital expenditures remained fairly stable as a percentage of sales (figure 6). Therefore, capex was projected considering the historical correlation that it had with sales. The assumption behind this variable is that the capex will remain a stable margin of sales throughout the years as the average percentage of the capex to sales observed in the last 6 years. In this manner, the percentage for the future forecast of capex was 5.7%.

Figure 6 - Evolution of sales and CAPEX, 2013-2018



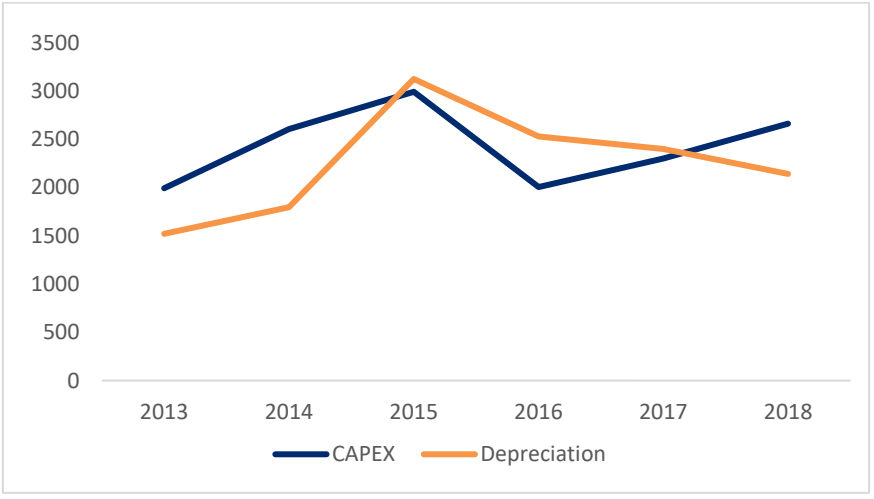
Source: Repsol

4.2.3. Depreciation and Amortization

Depreciation is largely connected to capex in the sense that both deal with business long term fixed assets. Capital expenditures are commonly related to the acquisition of property, plant and equipment. Unlike start-ups that typically have high capex levels, resulting from a high growth phase, companies that stand on a more stable stage tend to have depreciation with a high degree of convergence to their capital expenditures.

The assumption behind this is that depreciation and amortization, for the computations of future cash flows, will remain aligned to the level of correlation had with capex in the historical period observed. Depreciation estimation will represent 93.4% of the capital expenditures according to the historical period analysed.

Figure 7 - Evolution of D&A vs CAPEX, 2013-2018



Source: Repsol

4.2.4. Working capital

To maintain consistency and allow the variables to adjust for all the scenarios estimated, having sales as a forecast driver, working capital will be computed as a percentage of sales method. For the purpose of this dissertation working capital was computed according to the following formula:

$$WC = Accounts\ receivable + Inventories - Acounts\ Payable \quad (13)$$

Since the annual variation of working capital is presented in Repsol's cash flow statement, it was computed the value for 2018 which allowed to reach a working capital over sales ratio of 9.87% (table 3). The indicated percentage was assumed, for valuation purposes, to represent a stable percentage over the forecasted period permitting to estimate the variations in working capital.

Table 3 - Working Capital over sales ratio

€ million	2018
Sales	49 701,00
Working capital	4 904,00
% Working Capital/Sales	9,87%
Variation in Working capital	-389,00

Source: Own estimates

4.2.5. WACC

To reach the value for the weighted average cost of capital, the discount rate used for the FCFF computations, a series of assumptions were made. To simplify calculations this value will be considered constant for all the scenarios presented.

For the debt to equity ratio, it was considered the average weight obtained from Repsol's financial statements. Following the same perspective, the estimated tax rate was computed taking into account the average rate at which the company is taxed, in essence, the effective tax rates verified in the past years. Therefore, assumptions regarding the debt to equity ratio and the tax rate are, 48.4% and 31.8% respectively.

Concerning the risk premium and the beta, the assumptions considered were gathered from the Damodaran maps for the year 2019. The equity risk premium was assumed to be the Western Europe Average Equity Risk Premium and for the value of beta was assumed the Oil and Gas Industry Global Equity Levered Beta (table 4).

For the risk-free rate, the asset that commonly represents a long-term risk-free rate of return for European based companies is the 10-year German government bond, being considered the closest to a riskless asset. According to Bloomberg, the 10-year German government bond stands at a negative yield. However, as it is not expected within a medium or long term for this rate to persist at a negative rate, in this dissertation the risk-free rate will be considered 0.0%.

With the above-mentioned assumptions, the cost of equity was computed obtaining a value of 9.86%. The value for the cost of debt was extracted from Bloomberg estimates (See Appendix B).

Hereupon, the value of WACC was determined, which resulted in a discount rate of 6.85% (table 4).

Table 4 - Determination of WACC

WACC determination	
Effective Tax rate	31,8%
D/E	48,4%
Levered beta	1,32
Risk-free rate	0,00%
Equity Risk Premium	7,47%
Cost of equity	9,86%
Cost of debt	0,92%
Weighted average cost of capital (WACC)	6,85%

Source: Own estimates

4.3. DCF valuation

After defining all the necessary components, the Enterprise value is within reach to estimate for each of the three scenarios. As previously mentioned, for the estimations made, only the assumptions referred in the theories will be reflected, assuming that the rest remain stable for the purpose of facilitating calculations as we are dealing with a highly volatile market.

4.3.1. Neutral scenario

In the analysis of Repsol's historical sales evolution, it can be observed that the variations of past years are not linear. However, in a general context of evolution, it's conceivable to identify a pattern and a growth rate of 2.6% was obtained, value also assumed to persevere in perpetuity. In this matter, considering the industry in which Repsol is

integrated, where its core business stands on one of the most important raw materials that exist and given that its importance is based not only on fuels but also on hundreds of other products used daily around the world, this growth rate has been considered to be reasonable, as it mirrors what can be the large growth opportunities but also the possible less positive variations common in this industry.

All things considered, the FCFF approach was applied to estimate the Enterprise Value of Repsol (See Appendix F).

In order to get the estimated share price for Repsol, the Equity Value must be computed. To do so, it was subtracted the debt and added the cash and cash equivalents from the Enterprise Value. Considering the average amount of outstanding shares of Repsol, the neutral scenario estimates a share price of 20.47€.

Table 5 - Computation of share price (Neutral scenario)

Total Discounted FCFF (10 Years)	12 950
CF Perpetuity	2 171
WACC	6,85%
Terminal Value	52 097
PV of Terminal Value	26 865
Estimated Enterprise Value	39 815
(-) Debt	13 754
(+) Cash and cash equivalents	4 786
Estimated Equity value	30 847
Number of Outstanding shares	1 507
Estimated share price	20,47

Source: Own estimations

4.3.2. Matos Fernandes theory (Negative scenario)

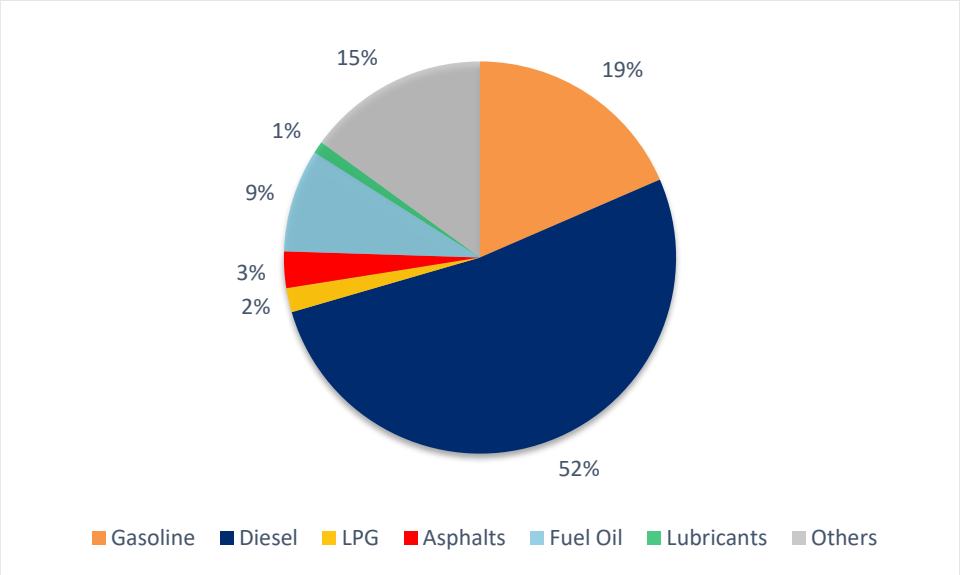
This theory stands on the grounds that diesel sales will decline in the coming years. The underlying premise behind this statement is based on the likely detachment of diesel-powered engines caused by awareness levels of pollution that they produce. The assumptions in this theory also state that the price of the diesel will approach gasoline making it less attractive. With this is expected to be a reduction in the purchase of diesel cars aggravated by the increasing regulations imposed by countries with special focus on Europe and the increasing incorporation of electric vehicles in the market will also impact the diesel's cars market share.

For the estimation of the impact that Repsol's sales might have with the diesel market share decrease, it was considered the above-mentioned market share loss that diesel has suffered of 15.5% between 2015 and 2018. Furthermore, to simplify this market share loss was assumed to persist throughout the forecasted period.

The next step was to measure the percentual effect that this diesels' decrease will represent in the portion of the Repsol's total sales. For this computation it was extracted from Bloomberg the portion of sales per segment that Repsol had in the last 6 years (2013-2018), considering the average of 88.2% as a representation of the downstream weight of sales (See Appendix G.2.1).

From Repsol's management report it was possible to obtain the portion of sales of its refining products, where diesel corresponds to 52% of the total downstream sales (figure 8). Thus, the representation of diesel over total sales is of 45.9%.

Figure 8 - Repsol's average refining production (2015-2018)



Source: Repsol

The European market is the one that most suffers from the effects that diesel is experiencing since it has the highest level of cars powered by this type of fuel. It was extracted from Bloomberg, the value of Repsol's sales in Europe that correspond to 80%. Furthermore, a value of 1.5% was assumed as the percentage that the new passenger cars represent in Repsol's yearly sales. This figure has been considered adjusted as diesel sales will only be affected in the passenger car fleet, as heavy cars are diesel combusted and

there is still no way around this. All things considered, a value of 0.52% was obtained, representing the impact of the market share loss in Repsol's total sales (table 6).

Table 6 - Percentage decrease regarding fall in diesel market share

MF Theory	**%**
Percentage of Repsol's diesel sales	45,9%
Percentage of Repsol's sales in Europe	80,0%
Percentage weight of Repsol's diesel sales in Europe	36,7%
Market share of new diesel cars fall from 2015-2018	15,5%
Average Market Share loss over the last 3 years	5,2%
Percentage impact of new car sales in Repsol's Diesel sales	1,5%
Percentual impact of a market share loss in Repsol's sales	0,52%

Source: Own estimates

As the effects occurring in diesel markets are not expected to have immediate repercussions, it was assumed that for 2019 the growth rate to be equal to the one estimated in the neutral scenario and from then on to reduce every year the market share loss computed. As for the perpetuity, a growth rate of 0% will be assumed expecting that the company will adjust to the changes taking place at the present.

Using the same method as in the neutral scenario, detailed in Appendix G, the share price estimated for the Matos Fernandes theory was 11.52€ (table 7).

Table 7 - Computation of share price (Matos Fernandes Theory)

Total Discounted FCFF (10 Years)	12 754
CF Perpetuity	1 803
WACC	6,85%
Terminal Value	26 330
PV of Terminal Value	13 578
Estimated Enterprise Value	26 332
(-) Debt	13 754
(+) Cash and cash equivalents	4 786
Estimated Equity value	17 364
Number of Outstanding shares	1 507
Estimated share price	11,52

Source: Own estimates

4.3.3. Carlos Barbosa Theory (Positive scenario)

Carlos Barbosa's theory is supported by the argument that technology will rapidly evolve and create diesel engines that will actually be less polluting than gasoline, thus

eliminating the most discrediting factor of this type of fuel these days. In the same vein, there are also studies which foresee difficulties in the incorporation of electric vehicles into the market due to the conditions that are required, in terms of the structural adaptations required in the cities and the high price that this alternative still presents today. Additionally, there is also an expectation that oil demand will increase derived from emerging market needs.

Despite the arguments presented, they represent expectations and there are no values to justify what may happen in the future. Thus, for this scenario it was assumed that the growth rate will be 0.5% higher than expected in the neutral scenario, obtaining a rate of 3.1%.

In light of the estimation of the FCFF, disclosed in Appendix H, it was conceivable to arrive at the Equity Value for the scenario and with this reach a share price value of 23.84€ (table 8).

Table 8 - Computation of share price (Carlos Barbosa Theory)

Total Discounted FCFF (10 Years)	13 094
CF Perpetuity	2 258
WACC	6,85%
Terminal Value	61 659
PV of Terminal Value	31 795
Estimated Enterprise Value	44 890
(-) Debt	13 754
(+) Cash and cash equivalents	4 786
Estimated Equity value	35 922
Number of Outstanding shares	1 507
Estimated share price	23,84

Source: Own estimates

5. Conclusion

The aim of this dissertation has been to determine what could be the repercussions that a company incorporated in the oil and gas industry might suffer, regarding the events observed in the diesel markets in these past recent years, namely the discredit of diesel-powered vehicles. Although there are already visible changes in the sector regarding this type of fuel, opinions differ as to what might happen in the near future to diesel cars market.

The elaboration of this study was performed through the FCFF discounted methodology, with the analysis focused on Repsol, a referenced company in the sector. As uncertainty prevails over what lies ahead, three scenarios have been developed, one neutral, one positive and one negative, based on the views of business-related individuals, to understand the impacts that the projections being made may have in a company.

A relevant feature of the market in which Repsol stands is that due to the natural business environment of this type of company, having as main raw material oil and its derivatives, it's a market represented by a high propensity to volatility. In this manner, the estimations produced were based on Repsol's sales variations.

After carrying out all the necessary studies on Repsol and defining the necessary assumptions, Repsol's Equity Valuation was performed for all the scenarios.

Firstly, the neutral scenario performed, considering a stable evolution of the company towards the future, resulting in a share price of 20.47€.

The second scenario (Matos Fernandes theory) places Repsol in a more negative path, considering the consolidation of the discredit of diesel-powered vehicles and the incorporation of electric vehicles in the market, which produced a share price of 11.52€. Taking into consideration the price of the neutral scenario, this represents a valuation decrease of 43.71%.

Thirdly, the positive scenario (Carlos Barbosa theory) assumes that electric vehicles will struggle to penetrate the market and that diesel is still a good solution with the appropriate technologic advancement. It also considers the emerging markets will increase their demand for oil. This represents an increase in the value of the company and the price per share obtained was 23.84€. When compared with the neutral share price it's verified an increase of 16.45%.

The analysis of the results shows that if the market bends towards the disfavour of diesel vehicles it will result in a considerable loss of value for Repsol, reaching a value that Repsol only registered for two short periods in the last 10 years. If the market adjusts in favour of diesel, a fair appreciation of the value of Repsol is warranted, which will be close to the highest share price of Repsol in the last decade. However, the variation is lower to what it might be if the negative scenario prevails when comparing to the neutral scenario.

This study could be an instrument for creating a business development strategy by anticipating efficient solutions for value restoration, in the event of a negative deviation from the market and its consumption trends. On the other hand, it demonstrates the permanent need to monitor market fluctuations and tendencies. It also points to the need for this industry to be very attentive and to develop a penetration strategy in emerging markets such as China and India, among others, that will likely need these fuels for their economic growth and development process, as well as adapting to new alternative energies to compensate eventual losses in the European market.

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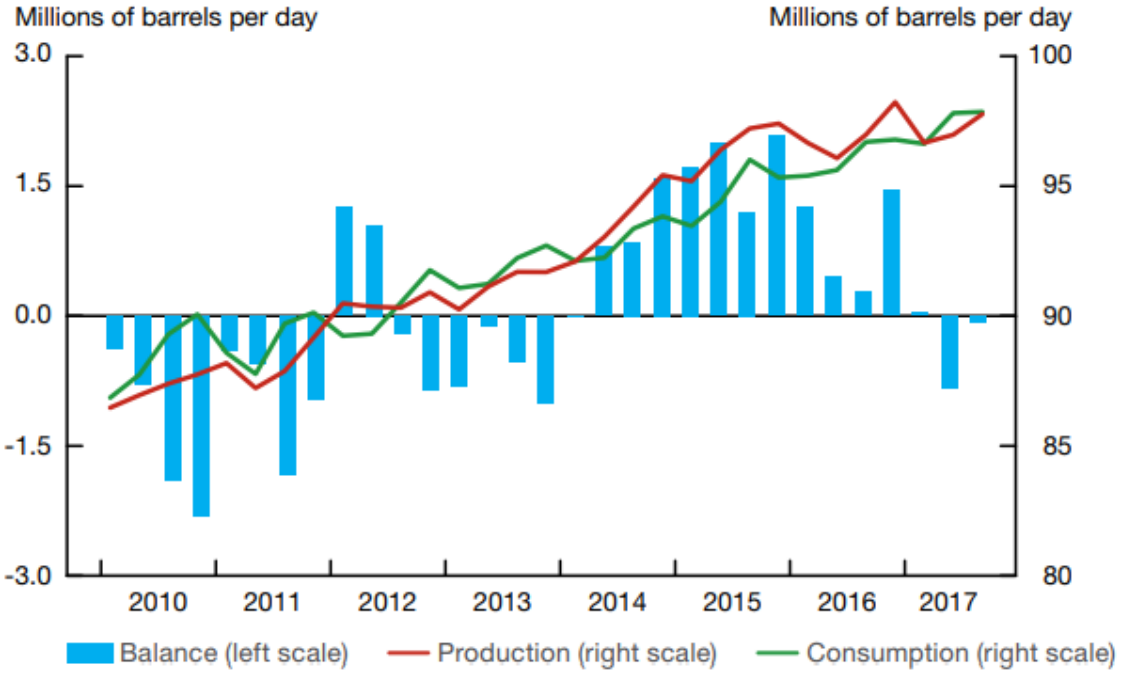
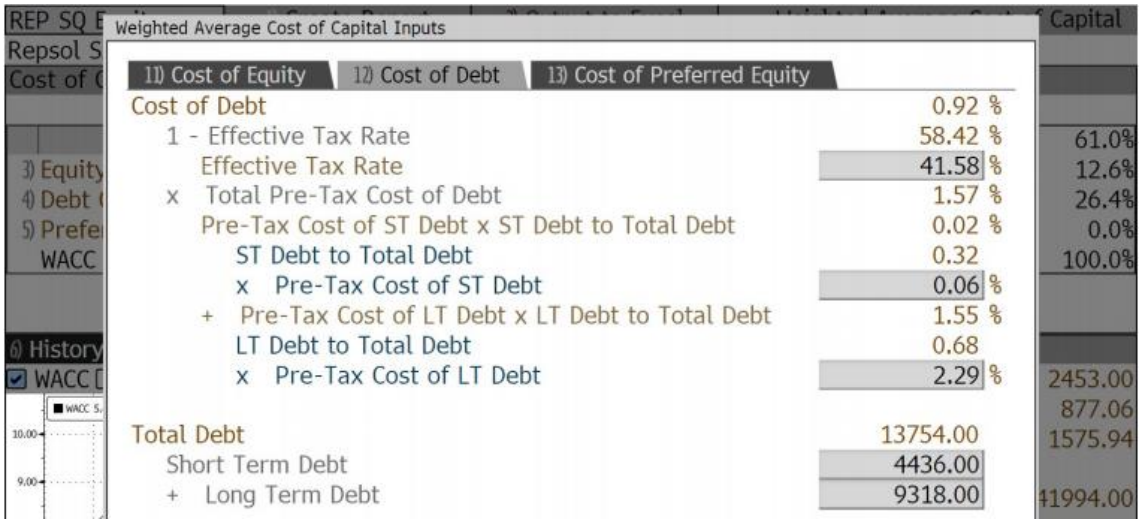
7. Appendix

A. Demand and supply balance (2010-2017)



Source: Bank of Canada review

B. Cost of Debt



Source: Bloomberg

C. Income Statement

(€ million)	2013	2014	2015	2016	2017	2018
Sales	46 089	45 433	39 582	34 556	41 242	49 701
Services rendered and other income	765	409	155	133	426	172
Changes in inventories of finished goods and work in progress inventories	-241	-224	-524	129	206	130
Income from reversals of impairment losses and gains on disposal of non-current assets	19	290	661	1 625	864	277
Other operating income	698	1 384	1 867	990	710	1 073
Operating revenue	**47 330**	**47 292**	**41 741**	**37 433**	**43 448**	**51 353**
Supplies	-38 439	-38 254	-28 833	-23 615	-31 093	-38 795
Personnel expenses	-1 671	-1 729	-2 129	-2 501	-1 892	-1 874
Other operating expenses	-4 610	-4 847	-6 455	-5 930	-4 353	-4 810
Depreciation and amortization of non-current assets	-1 520	-1 796	-3 124	-2 529	-2 399	-2 140
Impairment losses recognised and losses on disposal of non-current assets	-131	-588	-3 924	-947	-922	-1 281
Operating expenses	**-46 371**	**-47 214**	**-44 465**	**-35 522**	**-40 659**	**-48 900**
Operating income (EBIT)	**959**	**78**	**-2 724**	**1 911**	**2 789**	**2 453**
EBIT mg	2,08%	0,17%	-6,88%	5,53%	6,76%	4,94%
Depreciation	1 446	1 671	2 828	2 274	2 239	1 905
Amortization	74	125	296	255	160	235
EBITDA	**2 479**	**1 874**	**400**	**4 440**	**5 188**	**4 593**
Finance income	94	134	150	176	194	177
Finance expenses	-651	-576	-707	-741	-677	-407
Changes in the fair value of financial instruments	-129	529	1 052	189	34	200
Net exchange gains/(losses)	125	-304	-204	94	151	467
Other finance income and expenses	79	369	170	48	-14	-610
Financial result	**-482**	**152**	**461**	**-234**	**-312**	**-173**
Share of results of companies accounted for using the equity method after taxes	805	892	-89	194	630	1 053
Net income before tax (EBT)	**1 282**	**1 122**	**-2 352**	**1 871**	**3 107**	**3 333**
Income tax	-431	-146	996	-391	-1 220	-1 386
Net income from continuing operations	**851**	**976**	**-1 356**	**1 480**	**1 887**	**1 947**
Net income from continuing operations attributable to minority interests	28	39	-42	-43	-40	-18
Net income from continuing operations	**879**	**1 015**	**-1 398**	**1 437**	**1 847**	**1 929**
Net income from discontinued operations	-684	597	-	299	-	412
Total Net income	**195**	**1 612**	**-1 398**	**1 736**	**1 847**	**2 341**

D. Balance Sheet

(€ million)	2013	2014	2015	2016	2017	2018
Net Property, plant and equipment	-15 567	-19 191	-25 394	-27 268	-27 317	-28 660
Property, plant and equipment	32 929	36 507	53 770	54 810	52 154	54 341
Accumulated depreciation	-16 903	-19 366	-25 568	-27 513	-27 554	-28 910
Long term Investments	1 336	175	174	245	237	250
Long term Receivables	576	441	567	1 025	1 868	921
Other long-term assets	19 833	17 091	21 501	20 354	18 381	16 882
Intangible Assets:	1 729	1 859	4 782	5 109	4 584	5 096
Goodwill	490	498	3 099	3 115	2 763	3 011
Intangible	1 239	1 361	1 683	1 994	1 821	2 085
Deferred tax assets	4 079	3 967	4 743	4 746	4 057	3 891
Derivative and hedging assets						33
Investments in affiliates	10 340	11 110	11 797	10 176	9 268	7 194
Other long-term assets	3 685	155	179	323	472	668
Total non-current assets	**6 178**	**-1 484**	**-3 152**	**-5 644**	**-6 831**	**-10 607**
Cash and cash equivalents	5 716	4 638	2 448	4 687	4 601	4 786
Short term Investments	354	2 513	1 237	1 280	257	1 711
Account receivables	3 219	3 083	2 607	3 111	3 979	3 758
Inventories	4 938	3 931	2 853	3 605	3 797	4 390
Raw materials	2 107	1 549	786	1 187	1 244	1 640
Finished goods	2 579	2 136	1 754	2 110	2 252	2 426
Other inventory	252	246	313	308	301	324
Other short-term assets	3 549	2 876	3 607	3 245	2 137	2 649
Derivative and hedging assets	24	503	413	64	60	241
Assets held for sale	1 692	98	262	144	22	6
Taxes receivable	386	632	1 013	989	691	845
Other short-term assets	1 447	1 643	1 919	2 048	1 364	1 557
Total current assets	**17 776**	**17 041**	**12 752**	**15 928**	**14 771**	**17 294**
Total Assets	**23 954**	**15 557**	**9 600**	**10 284**	**7 940**	**6 687**
Shareholders' equity	27 733	27 502	26 843	28 487	30 197	30 468
Issued share capital	1 324	1 375	1 442	1 496	1 556	1 559
Share premium	6 687	6 687	26 030	24 232	25 541	25 894
Treasury shares and own equity instruments	-26	-127	-248	-1	-45	-350
Profit attributable to the equity holders	195	1 612	-1 398	1 736	2 121	2 341
Other equity instruments	19 553	17 955	1 017	1 024	1 024	1 024
Adjustments for changes in value	-526	435	1 691	2 380	-404	160
Financial assets available for sale	488	-5	3	6	-	13
Hedge transactions	-60	-163	-227	-171	-163	-106
Translation differences	-954	603	1 915	2 545	-241	253
Equity attributable to equity holders	**27 207**	**27 937**	**28 534**	**30 867**	**29 793**	**30 628**
Minority interests	243	217	228	244	270	286
Total equity	**27 450**	**28 154**	**28 762**	**31 111**	**30 063**	**30 914**

Long term Debt	5 780	7 524	10 491	9 396	10 012	9 318
Long term borrowings	4 517	6 110	8 951	7 846	8 666	7 891
Long term lease liabilities	1 263	1 414	1 540	1 550	1 346	1 427
Other non-current liabilities	6 308	5 968	9 466	9 605	7 747	7 736
Non-current liabilities	**12 088**	**13 492**	**19 957**	**19 001**	**17 759**	**17 054**
Payables & Accruals	5 008	3 941	5 674	5 724	5 119	5 327
Accounts payable	2 588	2 350	1 799	2 128	2 738	3 244
Accrued taxes	711	713	749	852	948	809
Other payables & Accruals	2 299	2 534	3 134	3 340	3 214	3 521
Short term Debt	1 998	694	1 791	1 532	957	997
Short term borrowings	8 413	3 952	7 004	6 885	4 178	4 239
Short term lease liabilities	154	176	207	208	195	197
Other Short-term liabilities	1 844	518	1 584	1 324	762	800
Current liabilities	**8 850**	**5 153**	**9 049**	**8 580**	**6 838**	**7 124**
Total Liabilities	**20 938**	**18 645**	**29 006**	**27 581**	**24 597**	**24 178**
Total equity and liabilities	**55 547**	**51 889**	**63 196**	**64 849**	**59 857**	**60 778**

E. Cash-flow statement

(€ million)	2013	2014	2015	2016	2017	2018
Net income before tax	1 282	1 122	-2 352	1 871	3 107	3 333
Adjusted result	1 467	1 410	6 081	2 547	2 146	2 360
Amortisation of non-current assets	1 520	1 796	3 124	2 529	2 399	2 140
Other adjustments to net profit/(losses)	-53	-386	2 957	18	-253	220
Changes in working capital	-275	966	1 370	-517	-110	-389
Other cash flows from operating activities	92	-315	-163	-11	-30	-725
Collections of dividends	628	530	363	920	511	472
Income tax receivable / (payable)	-425	-611	-128	-264	-320	-762
Other receipts / (payments) of operating activities	-111	-234	-398	-667	-221	-435
Cash flows from operating activities	**2 566**	**3 183**	**4 936**	**3 890**	**5 113**	**4 579**
Payments for investments	-2 335	-4 200	-12 232	-3 649	-3 094	-5 501
Companies of the group and associates	-143	-18	-8 974	-842	-327	-807
Property, plant and equipment, intangible assets and property investment	-1 992	-2 606	-2 991	-2 003	-2 300	-2 661
Other financial assets	-200	-1 576	-267	-804	-467	-2 033
Proceeds from disinvestments	268	4 792	2 778	4 056	254	4 074
Companies of the group and associates	144	116	894	3 090	16	3 372
Property, plant and equipment, intangible assets and property investment	82	84	352	813	78	119
Other financial assets	42	4 592	1 532	153	160	583
Other cash flows	-	4	494	-16	51	68
Cash flows from investment activities	**-2 067**	**596**	**-8 960**	**391**	**-2 789**	**-1 359**
Proceeds and (payments) on equity instruments:	1 014	-82	-135	-92	-293	-1 595
Issues	-	-	996	23	-	-
Redemption	-	-	-	-23	-	-
Acquisition	-106	-171	-318	-103	-304	-1 808
Disposal	1 120	89	183	11	11	213
Proceeds and (payments) on financial liability instruments:	-1 126	-3 184	1 255	-910	-1 163	-796
Issue	7 141	4 488	12 244	12 712	10 285	18 127
Return and amortization	-8 267	-7 672	-10 989	-13 622	-11 448	-18 923
Payments on stockholder remuneration and other equity instruments	-470	-1 712	-488	-420	-332	-297
Other cash flows from financing activities:	-1 026	-474	147	-631	-573	-344
Payments of interests	-591	-610	-682	-591	-537	-454
Other receipts/(payments) of financing activities	-435	136	829	-40	-36	110
Cash flows from financing activities	**-1 608**	**-5 452**	**1 775**	**-2 053**	**-2 361**	**-3 032**
Exchange rate fluctuations effect	-18	147	59	11	-49	-3
Net increase/(decrease) in cash and cash equivalents	**-1 127**	**-1 526**	**-2 190**	**2 239**	**-86**	**185**
Cash and banks	3 911	2 210	2 311	3 207	3 753	4 124
Other financial assets	1 805	2 428	137	1 480	848	662
Cash and cash equivalents at end of period	**5 716**	**4 638**	**2 448**	**4 687**	**4 601**	**4 786**

F. FCFF Valuation (Neutral Scenario)

(€ million)	**2018**	**E2019**	**E2020**	**E2021**	**E2022**	**E2023**	**E2024**	**E2025**	**E2026**	**E2027**	**E2028**	**Perpetuity**
Sales	49 701	50 979	52 290	53 635	55 015	56 430	57 881	59 370	60 897	62 463	64 069	65 717
Growth rate		2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%
EBIT Margin	4,9%	5,2%	5,5%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%
EBIT	2 453	2 653	2 862	3 080	3 159	3 241	3 324	3 409	3 497	3 587	3 679	3 774
Tax rate	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%
EBIT (1-t)	1 673	1 810	1 952	2 101	2 155	2 210	2 267	2 326	2 385	2 447	2 510	2 574
Capex	2661	2 842	2 916	2 991	3 067	3 146	3 227	3 310	3 395	3 483	3 572	3 664
Variation in working capital	-389	-126	-129	-133	-136	-140	-143	-147	-151	-155	-159	-163
Depreciation	2140	2 656	2 724	2 794	2 866	2 940	3 016	3 093	3 173	3 254	3 338	3 424
FCFF	763	1 497	1 632	1 772	1 818	1 865	1 913	1 962	2 012	2 064	2 117	2 171
WACC		6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%
Accumulated discount rate		0,936	0,876	0,820	0,767	0,718	0,672	0,629	0,589	0,551	0,516	
Discounted FCFF YoY		1 401	1 429	1 453	1 395	1 339	1 285	1 234	1 185	1 137	1 092	

F.1. Variation in Working Capital

(€ million)	**2018**	**E2019**	**E2020**	**E2021**	**E2022**	**E2023**	**E2024**	**E2025**	**E2026**	**E2027**	**E2028**	**Perpetuity**
Sales	49 701,00	50 979,27	52 290,42	53 635,29	55 014,75	56 429,69	57 881,02	59 369,67	60 896,61	62 462,83	64 069,33	65 717,14
Growth rate		2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%	2,6%
Working capital	4 904,00	5 030,13	5 159,50	5 292,20	5 428,31	5 567,92	5 711,12	5 858,01	6 008,67	6 163,21	6 321,72	6 484,31
% Working Capital/Sales	9,87%											
Variation in Working capital	-389,00	-126,13	-129,37	-132,70	-136,11	-139,61	-143,20	-146,89	-150,66	-154,54	-158,51	-162,59

G. FCFF Valuation (Matos Fernandes theory)

(€ million)	**2018**	**E2019**	**E2020**	**E2021**	**E2022**	**E2023**	**E2024**	**E2025**	**E2026**	**E2027**	**E2028**	**Perpetuity**
Sales	49 701	50 979	52 024	52 819	53 350	53 609	53 588	53 288	52 711	51 865	50 763	50 763
Growth rate		2,6%	2,0%	1,5%	1,0%	0,5%	0,0%	-0,6%	-1,1%	-1,6%	-2,1%	0,0%
EBIT Margin	4,9%	5,2%	5,5%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%
EBIT	2 453	2 653	2 848	3 033	3 064	3 079	3 077	3 060	3 027	2 978	2 915	2 915
Tax rate	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%
EBIT (1-t)	1 673	1 810	1 942	2 069	2 090	2 100	2 099	2 087	2 065	2 032	1 988	1 988
Capex	2661	2 842	2 901	2 945	2 975	2 989	2 988	2 971	2 939	2 892	2 830	2 830
Variation in working capital	-389	-126	-103	-78	-52	-25	2	30	57	83	109	0
Depreciation	2140	2 656	2 711	2 752	2 780	2 793	2 792	2 776	2 746	2 702	2 645	2 645
FCFF	763	1 497	1 649	1 798	1 842	1 879	1 905	1 922	1 929	1 926	1 912	1 803
WACC		6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%
Accumulated discount rate		0,936	0,876	0,820	0,767	0,718	0,672	0,629	0,589	0,551	0,516	
Discounted FCFF YoY		1 401	1 445	1 474	1 414	1 349	1 280	1 209	1 136	1 061	986	

G.1. Variation in Working Capital

(€ million)	**2018**	**E2019**	**E2020**	**E2021**	**E2022**	**E2023**	**E2024**	**E2025**	**E2026**	**E2027**	**E2028**	**Perpetuity**
Sales	49 701,00	50 979,27	52 024,29	52 819,15	53 350,42	53 608,53	53 588,04	53 287,81	52 711,08	51 865,42	50 762,58	50 762,58
Growth rate		2,6%	2,0%	1,5%	1,0%	0,5%	0,0%	-0,6%	-1,1%	-1,6%	-2,1%	0,0%
Working capital	4 904,00	5 030,13	5 133,24	5 211,67	5 264,09	5 289,56	5 287,53	5 257,91	5 201,00	5 117,56	5 008,75	5 008,75
% Working Capital/Sales	9,87%											
Variation in Working capital	-389,00	-126,13	-103,11	-78,43	-52,42	-25,47	2,02	29,62	56,91	83,44	108,82	

G.2. Sales Breakdown

G.2.1. Repsol sales per segment

Sales pre segments	2013	2014	2015	2016	2017	2018
Downstream	90,5%	91,3%	88,8%	86,7%	86,1%	85,9%
Upstream	9,5%	8,7%	11,2%	13,3%	13,9%	14,1%

G.2.2. Repsol refining production

Refining production	2015	2016	2017	2018
Gasoline	18%	19%	18%	19%
Diesel	53%	51%	53%	51%
LPG	2%	2%	2%	2%
Asphalts	3%	3%	3%	3%
Fuel Oil	8%	9%	8%	9%
Lubricants	1%	1%	1%	1%
Others	15%	15%	15%	15%

H. FCFF Valuation (Carlos Barbosa theory)

(€ million)	**2018**	**E2019**	**E2020**	**E2021**	**E2022**	**E2023**	**E2024**	**E2025**	**E2026**	**E2027**	**E2028**	**Perpetuity**
Sales	49 701	51 228	52 801	54 423	56 095	57 819	59 595	61 425	63 312	65 257	67 262	69 328
Growth rate		3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%
EBIT Margin	4,9%	5,2%	5,5%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%	5,7%
EBIT	2 453	2 666	2 890	3 125	3 221	3 320	3 422	3 527	3 636	3 748	3 863	3 981
Tax rate	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%	31,8%
EBIT (1-t)	1 673	1 819	1 971	2 132	2 197	2 265	2 334	2 406	2 480	2 556	2 635	2 716
Capex	2661	2 856	2 944	3 035	3 128	3 224	3 323	3 425	3 530	3 639	3 750	3 866
Variation in working capital	-389	-151	-155	-160	-165	-170	-175	-181	-186	-192	-198	-204
Depreciation	2140	2 669	2 751	2 836	2 923	3 012	3 105	3 200	3 299	3 400	3 504	3 612
FCFF	763	1 481	1 623	1 773	1 827	1 883	1 941	2 001	2 062	2 126	2 191	2 258
WACC		6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%	6,85%
Accumulated discount rate		0,936	0,876	0,820	0,767	0,718	0,672	0,629	0,589	0,551	0,516	
Discounted FCFF YoY		1 386	1 422	1 453	1 402	1 353	1 305	1 259	1 214	1 171	1 130	

H.1. Variation in Working Capital

(€ million)	**2018**	**E2019**	**E2020**	**E2021**	**E2022**	**E2023**	**E2024**	**E2025**	**E2026**	**E2027**	**E2028**	**Perpetuity**
Sales	49 701,00	51 227,78	52 801,46	54 423,48	56 095,32	57 818,53	59 594,67	61 425,37	63 312,31	65 257,22	67 261,87	69 328,11
Growth rate		3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%	3,1%
Working capital	4 904,00	5 054,65	5 209,92	5 369,97	5 534,93	5 704,96	5 880,21	6 060,84	6 247,03	6 438,93	6 636,73	6 840,61
% Working Capital/Sales	9,87%											
Variation in Working capital	0,00	-150,65	-155,27	-160,04	-164,96	-170,03	-175,25	-180,64	-186,18	-191,90	-197,80	-203,87